69463

S/069/60/022/02/006/024
D034/D002

On the Flow of Rubber-like Polymers and of Their Mixtures With Carbon Blacks

the Ostwald - de Villiers (Russian transliteration - Ostval'd-deVil'ye) empirical exponential law

$$\mathcal{E} = \frac{1}{\eta'} \cdot \sigma^n$$

(n - index of deviation from Newtonian flow ($n \geq 1$);

σ - shear stress; η' - material constant coinciding with viscosity η at n = 1). The index n increases with active filler content and does not change when an in-active filler is added. The temperature dependence of the viscosity of the studied systems is described by the exponential equation $\eta = Ae^{E/kT}$ (A - constant; E - magnitude having the dimension of the activation

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S/069/60/022/02/006/024
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On the Flow of Rubber-like Polymers and of Their Mixtures With Carbon Blacks

energy). The authors determined the values for the activation energy of viscous flow and calculated the elementary unit of flow. It was found that the temperature coefficients of viscosity and activation energy do not depend on nature and amount of the filler. There are 5 graphs, 1 set of graphs, 1 diagram, 3 tables and 11 references, 6 of which are Soviet, 4 English and 1 German.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti, Moskva (Scientific Research Institute of the Rubber Industry, Moscow)

SUBMITTED: March 12, 1959

Card 4/4

BARTENEV, G.M.; TSEPKOV, L.P.

Nature of the scale effect of ice. Zav.lab. 26 no.3:330-331 '60.
(MIRA 13'6)

1. Gosudarstvennyy nauchno-issledovatel'skiy institut stekla.
(Strength of materials)
(Ice--Testing)

S/032/60/026/009/011/018
B015/B058

AUTHOR: Bartenev, G. M.

TITLE: The Anisotropy and Nature of the Scale Factor in Glass

PERIODICAL: Zavodskaya laboratoriya, 1960, Vol. 26, No. 9,
               pp. 1136 - 1140

TEXT: ·Investigations concerning the influence of sample dimensions on
the strength of glass fibers and plates have already been conducted at
the author's Institute (Refs. 5,6), and it was established that the
scale factor is not of a statistical nature. This is explained by the
various thermal and mechanical properties of glass in the preparation
of thin and thick samples. In the paper under review, these character-
istics of the scale factor are discussed for glass fibers and glass
plates. In glass fibers, the anisotropy of the scale effect becomes
evident by the fact that the tensile strength depends on the thickness d
and the length l according to various laws: $\sigma = A + B/d$ (1) and

$\sigma = C/l^{1/n}$ (2), respectively. Equation (1) was derived by S. N. Zhurkov

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The Anisotropy and Nature of the Scale   S/032/60/026/009/011/018
Factor in Glass   B015/B058

(Ref. 8) and other scientists, but it is only valid for glass fibers.
Equation (2) was obtained by the author (Ref. 5) and agrees well with
experimental data for glass fibers as well as glass rods (Fig. 1). The
author states that the glass fiber shows a strongly expressed anisotropy
of the scale effect, the length having a different influence on the
strength than the diameter. It may be assumed that during the drawing-
out process of the glass fiber, an orientation of the firm bonds takes
place along the fiber axis, which is the stronger, the higher the de-
gree of drawing out, so that the strength of the fiber in axial direc-
tion increases with the latter. Three types of bending strength are
distinguished for glass plates, two are related to the strength of the
edge and one to the surface strength. The surface strength of glass
plates with damaged and undamaged edges differs strongly, as was al-
ready observed by A. I. Ivanova (Ref. 14) and B. Ya. Levin (Ref. 15).
The influence of the glass-plate thickness on the strength is apparent-
ly due to thermoelastic stresses, the temperature gradient, and the
defects resulting thereby, and on the other hand to a "statistic" scale
factor owing to heterogeneous defects distributed at random. A doctor's

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The Anisotropy and Nature of the Scale   S/032/60/026/009/011/018
Factor in Glass   B015/B058

thesis by M. S. Aslanova, Institut fizicheskoy khimii AN SSSR (Institute
of Physical Chemistry of the Academy of Sciences USSR), as well as
B. Ya. Pines are mentioned. There are 5 figures and 15 references:
12 Soviet, 1 US, and 1 British.

ASSOCIATION: Gosudarstvenny nauchno-issledovatel'skiy institut stekla
               (State Scientific Research Institute for Glass)

Card 3/3

S/081/62/000/024/036/052
B106/B186

AUTHORS: Bartenev, G. M., Khazanovich, T. N.

TITLE: Theory of elastic deformation of rubber

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 24(II), 1962, 922 - 923,
              abstract 24P776 (Uch. zap. Mosk. gor. ped. in-ta im.
              V. P. Potemkina, v. 86, 1960, 141 - 156)

TEXT: Based on the concepts of molecular rubber structure, a theory is
developed which establishes a relationship between stress and deformation
and which makes no allowance for the independence of the molecular chains.
The tensile strength along the chain is assumed constant, which approaches
the hypothesis on the orienting force acting upon each chain segment. σ_j,
the projection of the mean tensile strength onto the j-th axis, is a func-
tion of the relative elongation $\vec{t} = \vec{r}/L$ ($\vec{r}$ is the chain vector, L is the
full contour length of the chain). For a non-swelled network,

$\sigma_j = 1/S_j \int f(t)\cos\theta \ \overline{\cos} \ x \ dW(t,\theta)$ (S_j – surface for one intersection; x is
the angle between the force f in the intersection point and $\vec{t}$; θ is the
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Theory of elastic deformation of rubber

S/081/62/000/024/036/052
B106/B186

angle between $\vec{t}$ and the j-th axis; dW is the probability for the case that below the chains, intersecting the given surface element, there will be chains with a relative elongation between t and t + dt). For a swelled network: $\sigma_j^* = 1/S_j^* \int f(t)\cos\theta dW (t,\theta)$ since for the small deformations t < 1 and the functions entering the expression for σ_j are decomposed into a power series of t where the first term which does not cancel out is left over; then, $\sigma_j' = Ct_j/2S$. On the assumption that L = const, $\sigma_j' = C\bar{r}_j/2LS_j$; $\sigma_j^* = C\bar{r}_j LS_j^*$ ($\bar{r}_j$ is the averaged value of r); C is the coefficient of the first term not cancelling out when f(t) is decomposed). In non-deformed state: $\sigma_0 = C(G/V)^{2/3}/2g$ for non-swelled chains, $\sigma_0^* = C(G/V)^{1/3}/L$ for swelled chains (g is the factor depending on the chain structure; G is the complete amount of chains in volume V). For the small deformations con-sidered $\sigma_j' = \sigma_0\lambda_j$; $\sigma_j^* = \sigma_0^*\lambda_j^2$ ($\lambda_j = \bar{r}_j/\bar{r}_{0j}$ is the main multiplicity of elon-gation). Since $C = 3 kTL/L^2_{[*]}$ (L^2 is the RMS distance between the ends of the

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Theory of elastic deformation of rubber

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free chain), $\sigma_o^* = 3(G/V)kT\overline{r_o^2}/e\overline{h^2}$ and the elastic constant in the theory considered differs from the James and Gut elastic constant by a constant factor. The theory was compared with experimental data of other authors. It is possible to extend the theory to rubber of medium swelling. [Abstracter's note: Complete translation.]

Card 3/3

BARTENEV, G.M.; BRYAKHANOV, A.V.

Spring-back in carbon steels. Uch. zap. Mosk. gor. ped. inst.
86:109-139 '60.   (MIRA 16:3)
            (Steel) (Strains and stresses)

BARTENEV, G.M.; KHAZANOVICH, T.N.

On the theory of elastic deformations of rubber. Uch. sap. Mosk.
gor. ped. inst. 86:141-156 '60.   (MIRA 16:3)
                    (Rubber) (Strains and stresses)

BARTENEV, G.M.; REMIZOVA, A.A.

Determination and classification of phase transitions in simple
systems. Uch. sap. Mosk. gor. ped. inst. 36:157-183 '60.
(MIRA 16:3)

(Phase rule and equilibrium)

NIKONOVA, V.V.; BARTENEV, G.M., prof., rukovoditel'; DIDENKO, A.M., dotsent,
rukovoditel'

Classification of the structures of binary metal alloys of the
eutectic type. Uch. zap. Mosk. gor. ped. inst. 86:217-227 '60.
(MIRA 16:3)

(Alloys) (Eutectics)

BARTENEV, G. M. (Moscow)

Second-order phase transitions and   curves. Zhur. fiz. khim. 34
no.3:618-622 Mr '60.   (MIRA 13:11)

1. Moskovskiy pedagogicheskiy institut imeni V.P.Potemkina.
        (Alloys)   (Phase rule and equilibrium)

S/020/60/133/01/24/070
B014/B011

AUTHOR: Bartenev, G. M.

TITLE: Irreversible Flow of Rubber-like Polymers

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 1, pp. 88-91

TEXT: Polyisobutylene and rubber were examined by the method of constant
shear stress at the physical laboratory of the Nauchno-issledovatel'skiy
institut rezinovoy promyshlennosti (Scientific Research Institute of the
Rubber Industry). The otherwise frequently observed slowing down of de-
formation and the constant rate of irreversible flow were found only with
low shear stresses. Considerable differences arose with greater stresses
(Fig. 1). It is further shown that the occurrence of a minimum in the
diagrams on increased stresses is caused by two different processes. The
first one is in connection with the drop in the development rate of
highly elastic deformation, the second is in connection with the growing
rate of irreversible flow. The constant deformation rate at low stresses
is in agreement therewith. The curve in Fig. 3 shows the influence exerted
by stress on the rate of irreversible deformation. Empirical formulas were

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$\sqrt{B}$

Irreversible Flow of Rubber-like Polymers   S/020/60/133/01/24/070
                                              B014/B011

suggested for steady flow processes of polymers, and the author discusses
them in the following. In this connection, the change in viscosity under the
action of shear stress is described, and the action of heat motion is dis-
cussed. Mention is made of P. A. Rebinder, N. V. Mikhaylov, and B. A.
Dogadkin. The investigations were conducted jointly with L. A. Vishnitskaya
and N. A. Makarova. The viscosimeter used was a new design worked out by
M. P. Volarovich. The technique was developed in cooperation with N. M.
Novikova. There are 3 figures and 11 references: 7 Soviet, 3 American,
and 1 German.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti
               (Scientific Research Institute of the Rubber Industry)

PRESENTED: March 14, 1960, by P. A. Rebinder, Academician

SUBMITTED: March 2, 1960

$\sqrt{B}$

Card 2/2

BARTENEV G.M

S/020/60/133/02/24/068
B019/B060

AUTHORS: Bartenev, G. M., Razumovskaya, I. V.

TITLE: Theoretical Strength and Critical Break Stress of Solids

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 133, No. 2,
                pp. 341-344

TEXT: In the introduction the authors define the theoretical strength
according to Born (Ref. 1) and Zwicky (Ref. 2), and the critical stress
is defined as being the maximum of quasielastic strength at the tips
of cracks in the material. It is shown that when developing the formulas
for the physical theory of the strength, one must proceed from the
critical stress and not from the theoretical strength. On the basis of a
generalized crack model according to Griffith and P. A. Rebinder (Ref. 8),
shown in Fig. 2, the kinetic theory of the growth of a crack is
illustrated with the aid of the scheme of the changes in the potential
energy shown in Fig. 3. The authors then deal in greater detail with the
calculation of the technical strength according to Griffith (Ref. 9) and
the theoretical strength according to Orowan (Ref. 10). These formulas

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Theoretical Strength and Critical Break
Stress of Solids

S/020/60/133/02/24/068
B019/B060

yield good estimations of the values. Since, however, they contradict
the law of conservation of energy, one cannot expect exact results. It
may be seen from these considerations that the critical stress cannot
be calculated, but only estimated. There are 3 figures and 13 references:
6 Soviet, 3 German, 3 American, and 1 British.

ASSOCIATION: Moskovskiy gorodskoy pedagogicheskiy institut im. V. P.
Potemkina (Moscow Municipal Pedagogical Institute imeni
V. P. Potemkin)

PRESENTED: March 14, 1960, by P. A. Rebinder, Academician

SUBMITTED: March 2, 1960

VB

Card 2/2

//. 23/4

AUTHORS: Bartenev, G. M., Zakharenko, N. V.

TITLE: Rheological Properties of Rubber Mixtures in Shearing and Expansion

PERIODICAL: Kauchuk i rezina, 1961, No. 1, pp. 24-29

TEXT: The article lists the results of an investigation into the
yield point of rubber mixtures in shearing and expansion. Rubber mixtures
based on sodium-butadiene rubber with different amounts of filler, both of
the active and non-active variety, rubber mixtures of standard composition
and commercial rubber mixtures based on various rubbers for rubber articles
and footwear were studied. The shearing was obtained in a thin layer between
two flat-parallel plates. The instrument and the method used were described
in References 1 and 2. The expansion was carried out on a rupturing machine
at a rate of motion of the lower clamp of 100 mm/min, which corresponds to a
deformation rate of 0.067 1/sec. The deformation of the sample is expressed
in relation to the conditional tension f or the true tension : in the case
of expansion (Fig. 1). The nature of the expansion curves depends on the

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S/138/61/000/001/006/010
A051/A029

Rheological Properties of Rubber Mixtures in Shearing and Expansion

type of rubber in the mixture (Figure 2). Table 1 shows that with an in-
crease in the expansion rate of about ten times the yield point increases by
about 25 %. The rheological curves of shear deformation and the curves of
expansion were compared in order to draw a parallel between the yield pro-
cesses for various forms of the state of tension (Fig. 3, a). At a constant
shear tension τ = const. two types of curves are noted (Fig. 3, b): at low
tensions a continuous decrease of the rate of deformation and at high ten-
sions the curve has a minimum. The minima were noted most clearly for pure
rubber-like polymers of linear structure. There is a direct correspondence
between the rheological properties of the rubber mixtures in shearing and
the yield point in expansion. Figure 6 shows the relationship between the
shear tension in the case of γ = 0.01 1/sec at 82°C and the yield point in
expansion for rubber mixtures at $\dot{\gamma}$ = 0.067 1/sec at 20°C, where it is seen
that there is a regular connection between the viscous-fluid properties of
the mixtures in shearing and expansion. Various empirical equations are used
for obtaining a quantitative characteristic of the rheological properties of
materials in shearing. For linear polymers (natural rubber, polyisobutylene),

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Rheological Properties of Rubber Mixtures in Shearing and Expansion

the rheological curves are described by the formula:

$$\frac{\dot{\gamma}}{\tau} = a e^{\alpha/\tau/} \quad (1)$$

(Ref. 6), where γ is the rate gradient, $/\tau/$ is the absolute shear tension, a, α are constants. Formula 1, however, is not applicable to rubber mixtures, since in this case there is no correspondence with experimental data. For calculating the yield of these materials the following formula is recommended:

$$\dot{\gamma} = (\frac{\tau}{c})^n \quad (2),$$

where c and n are the material constants, depending on the temperature. The elasticity of the rubber mixtures expressed by Formula (2) is also expressed by the degree relationship:

$$\eta = c(\frac{\cdot}{\tau})^{n-1} \quad (3),$$

where $\eta = \tau/\dot{\gamma}$. The relationship of the c and n constants to the temperature and degree of filling confirms the literature data (Refs. 7, 8), according

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A051/A029

Rheological Properties of Rubber Mixtures in Shearing and Expansion

to which the constant ó depends more on the temperature than n does. The yield point determines the tension limits, below which the process of rubber treatment is actually impossible. Based on this fact, the determination of the yield point in expansion is recommended for a fast comparative evaluation of the quality of rubber mixtures. The expansion method is simple and accessible to any plant laboratory. There are 8 sets of graphs, 2 tables and 8 Soviet references.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti
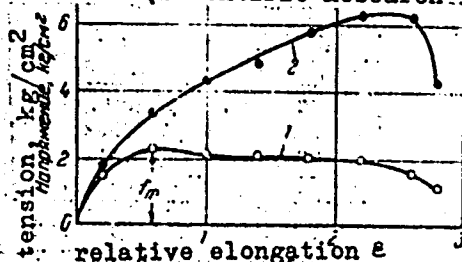(Scientific Research Institute of the Rubber Industry)

Figure 1:

Typical curve of expansion of rubber mixture:

1 - relative tension f,
2 - true tension ó.

Card 4/8

AUTHORS: Bartenev, G. M., Gul', V. Ye.

TITLE: Strength of polymers

PERIODICAL: Plasticheskiye massy, no. 1, 1961, 54-58

TEXT: This is the reproduction of a report made at the Conference on the
Strength of Polymers, May 16-18, 1960. The report presents a theoretical
interpretation of the behavior of polymers in tensile tests, developed by
kafedra khimii i fiziki polimerov i protsessov ikh pererabotki MITKhT im.
Lomonosova (Department of Chemistry and Physics of Polymers and of
Processes of Their Treatment, Moscow Institute of Fine Chemical
Technology imeni Lomonosov) and fizicheskaya laboratoriya NIIRP (Physical
Laboratory of the Scientific Research Institute of the Rubber Industry).
Mention is made of tensile tests performed with a Schapper dynamometer, a
PM-60 (RM-60) dynamometer, and a CKC-1 (SKS-1) time-lapse camera. In
addition, motion pictures have been taken of the rupture of polyethylene
terephthalate in polarized light. Summing up: 1) The strength of
polymers, like that of other substances, is of a statistical nature. As

Card 1/2

43755

S/081/62/000/023/068/120
B180/B144

/5 2600

AUTHORS: Tsepkov, L. P., Bartenev, G. M.

TITLE: Experimental study of glass fatigue

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 23, 1962, 497, abstract
23K456 (Steklo. Byul. Gos. n.-i. in-ta stekla, no. 2(111),
1961, 73-77)

TEXT: It is confirmed experimentally that there is a safe load for glass,
which is 30 % of its short-time resistance. If a specimen or object made
of glass fails to break after one month under a particular load it should
be able to stand this stress for a long time, several years in fact. The
dimensional factor is found to be important with long periods under stress.
[Abstracter's note: Complete translation.]

Card 1/1

BARTENEV, G.M. (Moskva)

Quasieutectic structure of liquid eutectics. Izv. AN. SSSR. Otd. tekh. nauk. Met. i topl. no.3:138-140 My-Je '61.   (MIRA 14:7)
(Liquid metals--Metallography) (Eutectics) .

BARTENEV, G.M. (Moskva); VISHNITSKAYA, L.A. (Moskva)

Law of deformations for highly elastic materials. Izv.
AN SSSR. Otd.tekh.nauk.Mekh. i mashinostr. no.4:175-177 Jl-Ag
'61.   (MIRA 14:8)
          (Deformations (Mechanics))

BARTENEV, G.M., doktor khimicheskikh nauk, prof.

Discussing the article "Filling of ring press molds with a rubber
mixture under the action of constant and alternating high pressure"
by M.D. Nusinov, A.A. Pozin, M.M. Maizel'. Izv.vys.ucheb.zav.;
tekh.leg.prom. no.5:130-132 '61.   (MIRA 14:12)
                    (Rubber machinery)
        (Nusinov, M.D.) (Pozin, A.A.) (Maizel', M.M.)

22567

15.2120

S/190/61/003/005/010/014
B110/B220

AUTHORS: Bartenev, G. M., Yeremeyeva, A. S.

TITLE: The rheological qualities of inorganic glasses above
               vitrification temperature and their structure

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 5, 1961, 740-747

TEXT: The viscosity, characteristic of the glass structure, is of particular
technological interest in the anomalous temperature interval just above the
vitrification temperature. In the anomalous viscosity range $(10^{13} - 10^8$
poises) the viscosity decreases down to equilibrium. Glass specimens of
bar form having 30 mm long and 8 mm thick necks were tested by means of
torsional stress above the vitrification temperature T_V (Table 1). The
shearing stress τ and the shearing deformation γ depend on the distance
r from the bar axis: $\tau = 2Mr/\pi R^4$; $\gamma = \alpha r/l$ (2), where M = torque, R = neck
radius of the specimen; α = twisting angle; l = length of neck. The
velocity of the irreversible flow and the character of deformation depend
on the stress. Fig. 1 shows the deformation-time curves for "Прокат"

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The rheological...

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S/190/61/003/005/010/014
B110/B220

(Prokat) glass at a stress of 0.1 kg/cm^2, which is below the yield point $\tau_m = < 1$ kg/cm^2. The flow shows not much viscosity, but reversible deformation prevails which is highly elastic in the beginning. The curve of Fig. 2 shows viscous Newtonian flow following $\tau = \eta d\gamma/dt$ (4) for a stress above the yield point. Figs. 4 and 5 show rheological curves of tested glasses, consisting normally of 3 parts: 1) According to P. Rehbinder, flow occurs under small stresses at practically undestroyed structure with constant Newtonian viscosity. 2) With increasing stress, the restoration of structure does not compensate the destruction and, thus, the viscosity decreases. 3) Under heavy stresses the steric structure is completely destroyed and the viscosity reaches the lowest constant value η_m which corresponds in order of magnitude to that of the pure dispersion medium (solvent). It remains constant for further increase of stress, corresponding to the Newtonian flow. In this rectilinear part of the rheological curves which have the form of an S, similar to those of disperse systems, there occurred, in the case of further stress increase, destruction of structure and gradual transition of the total mass of the glass bar to viscous flow. For $\tau_m < \tau_o$ (τ_o = yield point), the whole glass

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The rheological...

bar is elastic, for $\tau_m > \tau_0$, the glass bar is divided into 2 sections:
1) the external concentric section between the radii r and R is a highly viscous liquid, 2) the internal section with radius r deforms itself still as elastic body like the polymers. Thus, $r = R\tau_0/\tau_m$. If τ_m is a multiple of τ_0, the elastic section is negligible. At all points of the glass bar is: $\gamma = \gamma_{elast.} + \gamma_{visc.}$; $\tau = \tau_{elast.} + \tau_{visc.}$. The use of (2) and (4) results in: $\eta_m = 2ML/\pi R^4 d\alpha/dt$. In anomalous state, inorganic glasses are highly elastic like polymers, however only for small stresses below the yield point obtained thermomechanically between 0.1 and 0.5 kg/cm^2. The viscosities indicated in Table 2 coincided with the values found by M. V. Okhotin, based on the chemical composition of the glass. With regard to the great dependence of the rheological glass properties on temperature the following particularities were stated: 1) the viscosity η_m increases quickly with decreasing temperature (for an increase of temperature from 600°C to 710°C the viscosity of "Prokat" glass decreases from $2.4 \cdot 10^{11}$ to

Card 3/10

The rheological...

2.6·10^8 poises); 2) the higher the temperature, the lower the yield point (Fig. 6). The activation energy of the viscous flow was determined for the same glass (Fig. 7), whereby a linear dependence was found. For "Prokat" glass, it was obtained as being 101 kcal/mole. For a similar type of glass M. V. Okhotin and Andryukhina, laboratoriya silikatnykh splavov Instituta stekla (Laboratory for Silicate Melts of the Institute for Glass) found an activation energy of 100 kcal/mole based on the chemical composition. According to R. L. Myuller the actual values are 2 to 3 times less because of the incomplete rupture of the chemical binding forces. The effective viscosity is a function of the stress: $\eta = \tau_m/\gamma_m$; for small stresses $\eta = \eta_0 = 10^{13}$ poises it is constant in a certain range of stress.

The thermomechanical curves of inorganic glasses are similar to those of polymers. In both cases, the moduli of elasticity in the highly elastic range are lower by some powers of ten than those in the gaseous state. Since inorganic glasses in anomalous state show properties of polymers and dispersed systems with steric lattice structure, the existence of a loose steric lattice in the glass is assumed. Probably, the chains are formed by weak (silicon-oxygen etc.) primary valence bonds, which explains

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The rheological...   B110/B220

the low stability of the lattice. There are 8 figures, 2 tables, and
12 references: 9 Soviet-bloc and 3 non-Soviet-bloc. The reference to
the English-language publication reads as follows: Ref. 10: P. Rehbinder,
Faraday Society Discussion, 1954, No. 18, 151-160.

ASSOCIATION: Gosudarstvennyy institut stekla (State Institute for Glass)
              Gosudarstvennyy pedagogicheskiy institut im. V. I. Lenina
              (State Pedagogical Institute imeni V. I. Lenin)

SUBMITTED: September 1, 1960

Legend to Table 1: 1) Type and number of glass; 2) softening temperature,
T_v, °C; 3) denominations of the principal oxides; 4) not; 5) sheet of
industrial "Prokat". no. 1; 6) electrovacuum glass 3C-5 (ZS-5) "K", no. 2;
electrovacuum glass 3C-5 (ZS-5) "Na", no. 3; optical glass ТФ-5 (TF-5),
no. 4; optical glass Ф-1 (F-1), no. 5. 1_{T_c} = temperature at which the
highly elastic deformation begins to develop (3°C/min. velocity).

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22570
S/190/61/003/005/013/014
B110/B230

15.1000   1407,1436

AUTHORS: Bartenev, G. M., Marinina, V. T.

TITLE: The influence of the size factor and temperature upon the
           adhesive strength between polymers and glass

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 3, no. 5, 1961, 783-786

TEXT: For testing the adhesion between two surfaces of different character
there exist two mechanical methods: 1) pulling-off method which, like the
tensile test, determines the pulling-off force b in kg/cm^2. 2) The
frequently applied method of layer separation measures the specific energy
A in kg/cm and depends on the rate of separation as well as on other
factors. Since, in the case of 2) a complex and non-uniform state of
stress exists in the polymer film, numerous forces act in the crack, and
part of the energy applied is consumed by mechanical losses, the authors
believe method 1) to be more reliable. The pulling-off force determined
by method 1) is called henceforward the adhesive strength of two
materials, which depends only on the adhesion between the polymer and the
solid body, and on the conditions of manufacture and testing. In the

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present work, the influence of the size factor (area of contact) and
temperature upon the adhesion of polyvinyl butyral to glass was examined,
because the influence of the size factor had not been taken into con-
sideration up to this time. Its role in adhesion is, however, more
important than in strength tests. As the results of measurement are
widely spread, the mean value of 10 to 15 measurements was taken. Fig. 1
shows the characteristic distribution curve of the values of adhesive
strength, where $\varrho(\sigma)$ = function of distribution which enters into the
equation $\Delta N = N\varrho(\sigma) \cdot \Delta\sigma$, ΔN being the number of tests yielding strength
values within the range from σ to $\sigma + \Delta\sigma$, and N the total number of
tests. Similar curves are obtained by tensile tests of solid bodies.
Dependence of the adhesive strength on the nominal contact area S as
shown in Fig. 2 is analogous to the Weibull formula for solid bodies
expressed by the following law: $\sigma = C/S^{1/n}$. Since for the polymer tested
$n = 2$, $\sigma = K/D$, where D = diameter of the contact area. When σ is ex-
pressed in kg/cm^2 and D in cm, the constant K = 107. The statistical
character of adhesive strength is ensured by the augmentation of defects
with an increase of the contact area. Like in the case of solids there
is also a difference between the theoretical and technical strength

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(present in this examination). Contrary to the strength of metals, in-organic glasses etc., the strength of polymers is largely dependent on temperature (Fig. 4), particularly within and above the range of vitrifica-tion. With a rise of temperature, tensile strength decreases sharply. At 95°C, adhesive and cohesive strength are equal. There are 4 figures and 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: W. Weibull: A Statistical Theory of the Strength of Materials, Stockholm, 1939.

ASSOCIATION: Gosudarstvennyy institut stekla Moskva (State Institute of Glass, Moscow)

SUBMITTED: October 10, 1960

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22579

BARTENEV, G.M., doktor khimicheskikh nauk; GUL', V.Ye., doktor khimicheskikh nauk

Methods of determining the strength of polymers. Zhur.VKHO 6 no.4:
394-403 '61.   (MIRA 14:7)

(Polymers—Testing)

BARTENEV, G.M.

Method of designing an annealing system. Stek. i ker. 18 no.7:
8-9 Jl '61.   (MIRA 14:7)
                    (Glass manufacture)

BARTENEV, G.M.; ZAKHARENKO, N.V.

Rheological properties of rubber mixtures under shear and deformation stresses. Kauch. i rez. 20 no.1:24-29 Ja '61.   (MIRA 14:3)

1. Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.
                    (Rubber—Testing)

27545
S/138/61/000/006/003/006
A051/A129

I5.9300

AUTHORS: Khruslov, V. K., Bartenev, G. M.

TITLE: Effect of thermal processing in aggressive media on the structure
              and sealing properties of rubbers

PERIODICAL: Kauchuk i rezina, no. 6, 1961, 23 - 25

TEXT: Preliminary thermal processing of rubber sealers at a temperature
of 150°C in liquid aggressive media retains the contact tension much better and
brings about a slower growth of the residual deformation in subsequent service.
The thermally-processed sealer-rings give better hermetical protection. The auth-
ors of this article have investigated the mechanism of the latter effect. Rubber
based on CKH-26 (SKN-26) with a masticator (Rubber no. 1) was subjected to ther-
mal processing in a closed container at 150°C in the hydraulic liquid AMГ-10Ф
(AMG-10F); CKH-26 (SKN-26), CKH-18 (SKN-18) and thiocol-based rubbers (rubber
no. 2) were processed under the same conditions at 150°C in kerosene. A study was
made of the change in the static 24-hour sample under compression depending on the
duration of the thermal processing in liquids and in air, and the linear dimen-
sions of the samples, the weight swelling and hardness. The obtained data led to a

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Effect of thermal processing in aggressive media...

conclusion of the structural change in the rubber as a result of thermal proces-
sing. A further study was made of the relaxation of the rubber tension (at 30%
compression) in the same medium, where the thermal processing was carried out.
The experimental results showed that the tension in rubber no. 1 after thermal
processing in liquid decreases more slowly than in the same rubber not subjected to
thermal processing (Fig. 1 a). The given curves of relaxation indicate that the
rate of drop of the tension in the beginning is greater in rubber which is ther-
mally processed probably due to its swelling. The rubber no. 2 showed even more
marked results (Fig. 2). The assumption of the specific nature of structural
change in the investigated rubbers during the process of thermal treatment is con-
firmed by measuring the hardness (Fig. 3). The drop in the hardness is explained
by the fact that at the same time as this process takes place the swelling of the
rubber in the liquid medium also occurs. The entire thermal processing is re-
viewed in the following manner: the heating of the rubber in liquid at 150°C with-
out access of air brings about thermal structuralizing. The equilibrium module
of the rubber increases, but at the same time swelling takes place resulting in a
drop of the hardness and static modulus. By subsequent compression of the ther-
mally-processed rubber the tensions drop rapidly (physical relaxation). A further

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S/138/61/000/006/003/006

Effect of thermal processing in aggressive media...   A051/A129

drop in the tension takes place due to chemical relaxation. The swelling of the
rubber brings about a sharper initial drop of the tension in the compressed ther-
mally-processed sealer until a certain constant value is reached. Due to struc-
turalizing this drop is greater than in the sealer which is not thermally proces-
sed. Both factors improve the sealing properties of the rubber based on nitrile
raw materials, since they result in elevated and more stable values of the contact
tension. There are 3 sets of graphs and 2 Soviet-bloc references.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti (Scien-
tific Research Institute of the Rubber Industry)

Card 3/6

15.9300
15.1240

27938   S/138/61/000/007/006/007
A051/A129

AUTHORS: Bartenev, G.M.;   Gartsman, V.I.

TITLE: Relationship between the temperature of the loss of hermetic sealing in rubber compression linings and the temperature of vitrification

PERIODICAL: Kauchuk i rezina, no. 7, 1961, 28 - 30

TEXT: The authors have investigated the possibility of a connection between T_{1h} (the temperature of hermetic sealing loss) and the temperature of vitrification of rubber determined at the same rate of cooling. The loss of the hermetic sealing in rubber compression linings at low temperatures is the result of a loss of the high-elasticity properties of the rubber. When the cooling of the rubber takes place at top rate at a frequency of the external force $\omega \rightarrow 0$, i.e., when there is a shift from dynamic loads to static ones, then the temperature of mechanical vitrification $T_{mech.}$ will tend toward the temperature of structural vitrification T_g. Thus, the temperature of hermetic sealing loss connected with mechanical vitrification under conditions of a static load ought to be close to the temperature of structural vitrification, corresponding to the given rate of cooling. The temperature of the structural vitrification was determined by the

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Relationship between the temperature of....   27938 S/138/61/000/007/006/007
                                                A051/A129

dilatometric method. A comparison of T_{1h} and T_g indicates that for the majority of rubbers T_{1h} is somewhat more than T_g, and for other rubbers it is equal, but never lower. An increase in T_{1h} is explained by the fact that the vitrification process does not take place at a strictly constant temperature T_g, and in a certain temperature range, different for different rubbers, it starts at a temperature higher than T_g (Fig. 1). The following conclusions are derived: The temperature of hermetic sealing loss coincides with that of structural vitrification or is somewhat higher at the same rate of cooling. It exceeds it occassionally by 10°C. The determination of the temperature of hermetic sealing loss is a direct method for evaluating the frost-resistance of the packing seals at a given cooling rate. The temperature of structural vitrification may serve as an index of the frost-resistance of a material measured on a dilatometer at the same rate of cooling and acting as the lowest possible temperature of hermetic loss. There are 2 figures and 4 Soviet-bloc references.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti (Scientific Research Institute of the Rubber Industry)

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28802

S/138/61/000/009/007/011
A051/A129

15.9300

AUTHORS: Kolyadina, N. G., Bartenev, G. M.

TITLE: Effect of low temperatures on the hermetic sealing capacity of rubber
             linings

PERIODICAL: Kauchuk i rezina, no. 9, 1961, 27 - 31

TEXT: A study was conducted on the effects of low temperatures on the cri-
tical pressure of loss of sealing and on the contact tension of compression of
the linings. It was noted that with a drop in temperature the hardness of the
rubber sharply increases (Fig. 1). The contact tension (i.e., the resilient re-
sistance of the lining relative to a unit area of the rubber contact with the
metal) drops with a drop in the temperature, whereas the hardness of the rubber
increases (Fig. 2) due to the fact that the measured contact tension is the equi-
librium tension of the compressed rubber or close to it. It decreases with a
drop in the temperature. Rubber linings of $CKБ$ (SKB) showed an increase in the
compression module with a drop in temperature from 20 to -60°C, i.e., by 6 times;
a drop in the contact tension in the same interval by a factor of about 2 and an
increase in the critical pressure of loss of sealing by about 6 - 7 times (Fig. 4).

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Effect of low temperatures on the...

The sealing properties of the linings are not characterized by the magnitude of the contact tension, which is explained by an increase in the friction force and hardness. Experiments to test the relative role played by these two factors in elevating the stability of the rubber linings at low temperatures using lubricated surfaces of contact between the rubber lining and the flange indicated that a drop in the friction reduces the critical pressure of sealing loss. An increase in the critical pressure with a drop in the temperature for linings with non-lubricated surfaces is explained by the increase in friction. Linings compressed between flat flanges with a loss in the sealing capacity, have a critical pressure which increases with a drop in the temperature, since the magnitude of the contact tension also drops. An increase of the critical pressure with a drop in the temperature is noted up to a certain critical temperature T_{cr}, below which the lining loses its sealing capacity. The critical pressure drops to zero at temperatures of vitrification T_g. Lubrication of the contact surfaces with low-temperature lubricants causes the temperature dependence on the critical pressure to drop sharply, which indicates the important role played by the friction force in the stability of the lining. The increase in the critical pressure within the region of low temperatures, up to T_{cr}, is explained by an increase in the friction

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Effect of low temperatures on the...

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coefficient (which is sharper than the drop of the contact tension); and partial-ly by the increase in the lining hardness. All the obtained results indicate that the contact tension in itself does not determine the critical pressure of sealing loss, neither at low nor at elevated temperatures. There are 7 figures and 7 references: 6 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: R. E. Morris, J. W. Hollister, A. E. Barrott, Ind. Eng. Chem., 42, no. 8, 1581 (1955).

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti i Lenin-gradskiy filial NIIRP (Scientific Research Institute of the Rubber Industry and the Leningrad Branch of the NIIRP)

Card 3/5

15·9300

AUTHORS: Bartenev, G.M., Bryukhanova, L.S.

TITLE: Static deformation of rubber-like polymers

PERIODICAL: Kauchuk i rezina, no. 12, 1961, 12 - 15

TEXT: Static deformations are defined as being those which remain con-
stant. A study was conducted on the deformation of rubber-like polymers under
conditions of the relation between tensions and deformations, related to a given
time of observation. A single-axle expansion was investigated under static loads
of various magnitude for non-filled rubbers, based on non-crystallizing rubbers:
CKБ (SKB), CKC-10 (SKS-10), CKC-30 (SKS-30), CKH-18 (SKN-18), CKH-26 (SKN-26),
CKH -40 (SKN-40); with high-elastic equilibrium moduli 2.6 ± 1 kg/cm^2 and
8.8 ± 1 kg/cm^2, measured according to the НИИРП (NIIRP) method. The following
symbols were used: F - weight of the load in kg, S_0 - initial area of the
transverse section in cm^2, $f = F/S_0$ - conditional tension or specific load
(on the initial cross section) (kg/cm^2), δ - true tension calculated according
to the formula: $\delta = \lambda f$, where λ - is the multiplicity of the expansion,
$\lambda - 1 = \varepsilon$ - expansion deformation (relative elongation). The static moduli E

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Static deformation of rubber-like polymers

S/138/61/000/012/003/008
A051/A126

were calculated from the slope of the lines obtained (relation between deformations and corresponding true tensions, relative to the same time of observation), by using the Boltsman equation. The following conclusions are drawn: The law of proportionality, previously established for equilibrium deformation of rubber-like lattice polymers is noted also for non-equilibrium static deformations at constant deformations (tension relaxations and at constant loads (fatigue). Thus, in calculating the static deformations within certain limits, the law of proportionality may be applied, if the resilience modulus is taken into account as being dependent on the duration of the loaded state. These conclusions were found to coincide with the mathematical theory of Boltsman. There are 1 figure and 10 references: 8 Soviet-bloc and 2 non-Soviet-bloc. The reference to the most recent English-language publication reads as follows: F.P. Baldwin, J.E. Ivory, R.L. Anthony, J. Appl. Phys., 26, 750 (1955).

ASSOCIATION: Moskovskiy pedagogicheskiy institut im. V.I. Lenina i Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti (Moscow Teachers Institute im. V.I. Lenina and the Scientific-Research Institute of the Rubber Industry)

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S/020/61/141/002/010/027
B104/B138

AUTHORS: Bartenev, G. M., and Lavrent'yev, V. V.

TITLE: Elastic contact friction between surfaces

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 2, 1961, 334-337

TEXT: In the case of elastic contact between two bodies, for each value of the normal load N there is a fully defined corresponding area of effective contact S. Strictly speaking this relation is only theoretical. Nowadays it is assumed that for metals and rubber the relation $F = cS$ holds between the force of friction F and the area of effective contact S, where c is the specific frictional resistance. Fig. 1 represents the specific friction between HK (NK) rubber and brass as a function of the normal pressure applied. By applying higher pressures it can be seen that $c = f$ is no longer dependent on pressure. This is important for friction calculations for rubber under high loads. In the steady state the specific load required to reach this limiting value is smaller than at the beginning of the shear, due to the fact that the actual area of contact increases in the sliding process. If the loads exceed 250 kg/cm^2 a

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Elastic contact friction between surfaces

S/020/61/141/002/010/027
B104/B138

constant specific friction is reached, provided the friction is steady. In this case the contact surface S_n will also be constant. $\varphi = S/S_n$ is introduced as the relative contact surface and it is suggested that when the normal pressure is raised the rate of increase in φ diminishes as the proportion of the surface outside the contact diminishes $(1 - \varphi)$, as the modulus of elasticity E of the rubber increases in uniaxial compression. These propositions are described by the differential equation

$d\varphi = \beta(1 - \varphi) \frac{dp}{E}$. The solution obtained from this equation is

$F = cS_n - c(S - S_0) \exp(-\beta/E) \cdot p$, where S_0 is the contact surface for $p \to 0$. In a graph representing $\log(cS_n - F)$ as a function of p, in accordance with

the above solution, the measured values shown in Fig. 2 plot almost exactly in a straight line. $A\beta = 0.17$ is obtained from the gradient of the straight line. There are 3 figures and 11 references: 9 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: P. Thirion, Rubb. Chem. Techn., 21, 505 (1948); J. Hurry, J. Prock, India Rubber World, 128, 619 (1953).

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Elastic contact friction between surfaces

$\hat{\cup}\angle0/61/141/002/010/027$
B104/B138

ASSOCIATION: Moskovskiy gosudarstvennyy pedagogicheskiy institut im. V. I. Lenina (Moscow State Pedagogical Institute imeni V. I. Lenin)

PRESENTED: July 1, 1961, by P. A. Rebinder, Academician

SUBMITTED: June 27, 1961

Fig. 1. Specific force of friction, $f = c$, as a function of the pressure applied to NK rubber in contact with brass.

Legend: (1) Initial friction; (2) steady friction.

Fig. 1
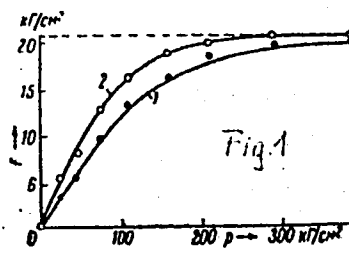
Card 3/0 3

L 18909-63   EWP(j)/EPF(c)/EWP(q)/EWT(m)/BDS/ES(s)-2   AFFTC/ASD
Pc-4/Pr-4/Pt-4   RM/WW/JD/MAY/JG

ACCESSION NR: AT3001904   S/2912/62/000/000/0122/0128

AUTHORS: Nikonova, V. V., Bartenev, G. M.

TITLE: On one mechanism of the crystallization of alloys of the eutectic type,

SOURCE: Kristallizatsiya i fazovyye perekhody*. Minsk, Izd-vo AN BSSR, 1962, 122-128

TOPIC TAGS: crystal, crystallization, crystallography, growth, vicinal, vicinaloid, eutectic, spherolite, Sn, Pb, Cd, Zn, azobenzene, piperonal, naphthaline, acetanilide, dinitrophenol.

ABSTRACT: The paper describes the results of experimentation relative to the formation of a conglomerate of microcrystals of 2 solid phases in the process of eutectic crystallization of a liquid single-phase solution. It is noted that each of the phases of the solid eutectic has a composition that differs sharply from the composition of the liquid that surrounds the crystal. In the course of the growth, the crystal of each of the phases is surrounded by a region with an elevated con-centration of the second component. The further growth of the crystal becomes impossible without diffusion which must equalize the concentration of the liquid phase and reestablish the conditions that are necessary for the growth of the

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ACCESSION NR: AT3001904   q

crystals of each of the 2 eutectics. The experimentation described relates to one
of the more usual forms of eutectic colonies, which the authors term "vicinal." It
is noted that as the growth of the crystal of the one phase comes to a halt because
it has exhausted the components of the liquid surrounding it, small "vicinaloids"
form and grow separately. Thus each vicinaloid gives rise to the growth of a
fiber-shaped excrescence, the ensemble of which, growing radially, forms the
skeleton of a eutectic colony in the form of a spherolite. The crystallization
according to this scheme was observed on the eutectic alloys Sn-Pb, Cd-Zn, Cd-Sn,
Pb-Cd, Sn-Zn, and also in the organic eutectics azobenzene-piperonal, azobenzene-
naphthalene, acetanilide-dinitrophenol. Various cooling procedures were employed,
proceeding at rates of 0.2°C/min up to 60°C/min, either continuously or in steps.
The formation of fibers was observed, and photographs are shown for various rates
of cooling. The dynamics of the growth of the individual fibers, their thickening,
and their separation from the parent body are described. It is concluded that, when
the centers of crystallization arise throughout the entire volume of the substance
and the heat removal occurs through the liquid phase, the vicinal colony assumes
the shape of a spherolite. Under rapid cooling and in the absence of supercooling,
when crystallization begins near the walls of the specimen, the vicinal colonies
assume the shape of a bundle of fibers directed toward the interior of the specimen.
It is emphasized that the process of formation of vicinal colonies is only a special

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ACCESSION NR: AT3001904

case of eutectic crystallization, and that not all systems can produce eutectic colonies of this type. Orig. art. has 4 figures.

ASSOCIATION: 00

SUBMITTED   00   DATE ACQ: 16Apr63   ENCL: 00

SUB CODE: CH, PH, MA, EL.   NO REF SOV: 004   OTHER: 000

Card 3/3

NIKONOVA, V.V. (Moskva); BARTENEV, G.M. (Moskva)

Vicinal crystallization of eutectic-type binary alloys. Izv.
AN SSSR. Otd. tekh. nauk. Met. i topl. no.1:100-104 Ja-F '62.
    (Chem   Physics   Solid   State of Statistical   (MIRA 15:2) Physics
1. Kafedra fiziki tverdogo tela i statisticheskoy fiziki
Moskovskogo gosudarstvennogo pedagogicheskogo instituta im.
V.I.Lenina.
                    (Alloys—Metallography)
                    (Crystallization)

S/138/62/000/005/008/010
A051/A126

/S. 9440

AUTHORS: Bartenev, G.M.; Kolyadina, N.G.

TITLE: The self-sealing phenomenon in hermetic-sealing units with rubber
            linings

PERIODICAL: Kauchuk i rezina, no. 5, 1962, 29 - 33

TEXT: A study is made of the change in contact tension of a rubber lining
during its application in flanges with restricting rings which, in turn, take
the place of a lining in the sealing units with groove or lock. An attachment
was designed for this purpose (Fig. 1), where the contact tension can be meas-
ured directly in the sealing unit under any pressure. The attachment has two
flanges (1, 2), connected through bolts. A restricting caliber (3) is placed
into the lower flange, serving as a wall of the groove or lock. The working
pressure is applied through the lower flange (compressed air). In the upper
flange, at the point of contact with the lining, there is an aperture into which
a rod (4) is placed, with a base area of 0.07 cm^2. The free motion of the rod,
within a range of 0.01 mm, is limited above by a metal screw (5), and below, by

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The self-sealing phenomenon in hermetic-sealing A051/A126

contact (6), installed with a textolite screw (7), so that it is electro-insulated from the upper plate. The tension is measured by the compensation method. The effect of the lining under lubrication was studied. The pertinent parameters are then treated. The following general conclusions were drawn: Beginning at a certain critical value of the pressure of the sealing medium, a phenomenon is noted which is self-sealing with a transfer of the excess pressure of the working medium to the flanges, according to Pascal's law. When working with groove-type flanges, the friction force should be reduced by lubricating the contact surfaces, since this promotes the occurrence of the self-sealing effect at lower working pressures of the sealing medium.

ASSOCIATION: Leningradskiy filial NII rezinovoy promyshlennosti, kafedra fiziki tverdogo tela MGPI im. V.I. Lenina (Leningrad Branch of the NII of the Rubber Industry, Department of Physics of Solid Bodies MGPI im. V.I. Lenin)

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The self-sealing phenomenon in hermetic-sealing ....

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Figure 1: Diagram of the attachment for measuring contact tension. 1, 2 - flanges; 3 - restricting caliber; 4 - rod; 5 - metal screw; 6 - contact; 7 - textolite screw; 8 - lining; 9 - flat spring. ·
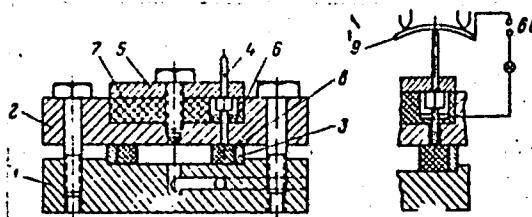
Card 3/3

38970

15.9300

8/138/62/000/007/001/002
A051/A126

AUTHORS: Bartenev, G.M.; Zaytseva, V.D.

TITLE: The effect of the shape coefficient on deformation and frost-re-
              sistance of rubber

PERIODICAL: Kauchuk i rezina, no. 7, 1962, 16 - 18

TEXT: The authors experimentally investigated the effect of the shape co-
efficient on various deformations and frost-resistance. Tests were made on an
Aleksandrov-Gayev frequency instrument designed at the NIIRP, for repeated com-
pression on cylindrical samples having various shape coefficients. It has been
previously established that with an increase of the bearing surface with respect
to the free surface, the hardness of the sample under compression increases.
Formulae are presented for various parameters. Attention is drawn to the fact
that in repeated deformations the conditions of a transition from pure compres-
sion to a longitudinal shift differ from static conditions. It has been estab-
lished that the shift to deformation of longitudinal flexure begins at a shape
coefficient value of $\phi \approx 0.06 - 0.07$, at tension amplitudes of 2 - 3 kgc/cm^2.

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A051/A126

The effect of the shape coefficient on ....

The loss of stability and an increase of sample flexibility of vitrified rubber begins at $\phi/\sqrt{\sigma} = 0.045$. Tests made on repeated shifting of rubber-metal samples under similar dynamic conditions as in compression, at various thicknesses L, height a, but the same width, revealed that in the highly-elastic state the shift modulus at a frequency of 10 col/min is equal to $G_p = 9$ kgc/cm^2. The compression modulus for the same rubber sample is $E_p = 25 - 27$ kgc/cm^2. These figures were found to agree with conclusions on the resilience theory for incompressible resilient material for which the shift modulus is three times less than the compression modulus. There are 5 figures.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti, Problemnaya laboratoriya fiziki polimerov MOPI im. V.I. Lenina (Scientific Research Institute of the Rubber Industry, Laboratory for Problems of Polymer Physics MOPI im. V.I. Lenin)

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S/138/62/000/010/003/008
A051/A126

AUTHORS: Kolyadina, N.G., Bartenev, G.M., Abrushchenko, B.Kh.

TITLE: Effect of residual deformation on highly-elastic regeneration of
             rubber at low temperatures

PERIODICAL: Kauchuk i rezina, no. 10, 1962, 28 - 31

TEXT: A study was made of rubber properties affected by accumulation of
residual deformation, namely, the effect on the highly-elastic regeneration of
rubber samples or rubber sealing parts. The causes of residual deformation ac-
cumulation are not analyzed. Both accumulation of residual deformation at high
temperatures and "freezing" of the highly-elastic deformation at low tempera-
tures cause the negative effect of a decrease of the highly-elastic regeneration.
The mathematical calculation of various parameters and graphs plotted from ex-
perimental results are presented. It was found that the experimental data agree
well with the computed values. The authors conclude that the frost-resistance
of commercial rubber sealing parts depends not only on the frost-resistance of
the rubber, but also on the degree of accumulation of residual deformation dur-

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Effect of residual deformation on ....

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A051/A126

ing storage or usage of the parts under tension, at temperatures over 0ºC. There
are 5 figures and 1 table.

ASSOCIATION: Leningradskiy filial nauchno-issledovatel'skogo instituta rezino-
voy promyshlennosti. Problemnaya laboratoriya fiziki polymerov
MGPI im. V.I. Lenina (Leningrad Branch of the Scientific Research
Institute of the Rubber Industry. Laboratory for Problems of Po-
lymer Physics MGPI im. V.I. Lenin)

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32349

S/190/62/004/001/011/020
B101/B110

//. 2210

AUTHORS: Bartenev, G. M., Zelenev, Yu. V.

TITLE: Dependence of deformation and mechanical losses in rubber-like polymers on temperature and frequency under periodic stress

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 1, 1962, 66 - 73

TEXT: The mechanical losses of net polymers, viz., of unfilled rubbers: natural (NR); polyisoprene СКИ (SKI); methyl vinyl pyridine МВПК (MVPK); butadiene styrene СКС-30 (SKS-30); nitrile СКН-18 (SKN-18), and СКН-40 (SKN-40), and polychloroprene ПХП (PKhP) were determined between -90 and +120°C. The deformation test of cylindrical rubber specimens (height 10 mm, diameter 8 mm) was carried out by an Aleksandrov-Gayev apparatus of NIIRP at a constant stress amplitude = 1.8 kp/cm² and at frequencies of 0.1, 1, 10, 100, and 1000 cycles/min. The mechanical losses were determined from the hysteresis loop at 0.01 and 0.1 cycles/min. The sinusoidal oscillations were superimposed to a static deformation (10% of the

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initial height of the specimens). Results: Temperature dependence of the deformation amplitude and two maxima of mechanical losses (Fig. 3). The low-temperature maximum of the losses was, depending on the rubber type, between 197 and 247°K. Above vitrification temperature, there were observed: (1) a high-temperature maximum of losses, (2) frequency dependence of the deformation amplitude. For the maximum loss at low temperatures, the following equation was derived: $T_{max} = U_o/R(\ln \sqrt{E_o/E_o'} - \ln a\omega)$

(7); U_o = activation energy (for NR = 14.1, for SKN-40 rubber = 17.6 kcal/ mole); E_o = elasticity modulus (about $4 \cdot 10^4$ kp/cm^2); E_o' = initial high-elasticity modulus (depending on the rubber type, 10 - 50 kp/cm^2);

ω = frequency; $a \approx 10^{-12}$ sec. For all rubbers, maximum losses at high temperature were in a narrow temperature range (85 - 100°C). For the maximum at high temperature, about the same value of U_o (25 - 26 kcal/mole) which was close to that for the energy of polysulfide bonds (27.5 kcal/mole) was calculated for all rubbers from $\tau_o = a \exp(U_o/RT)$ (4) (τ_o = relaxation time). The maximum was calculated from
Card 2/54

32349

S/190/62/004/001/011/020
B101/B110

Dependence of deformation ...

$T'_{max} = U_2/R(\ln \overline{E_\infty/E'_\infty} - \ln \omega)$ (9); U_2 = activation energy for the destruction of weak cross links; $E_{\infty} = E_2 + E'_\infty$, where E_2 = modulus depending on the weak cross links (polysulfide links), E'_∞ = equilibrium modulus of the network consisting of solid cross links only; $c = a$. No maximum loss was observed in the medium temperature range. Experimental data are explained by three types of relaxation processes: (1) Orientation of links of chain molecules; (2) overcoming the secondary nodes in translocation of segments; (3) destruction of polysulfide cross links. Process (1) causes the low-temperature maximum; process (3) the high-temperature maximum. For process (2), the spectrum of relaxation times is assumed to be so wide that at medium temperatures a maximum no longer occurs. The effects observed can be explained by a mechanical model (Fig. 4). G. L. Slonimskiy is thanked for a discussion. There are 6 figures, 1 table, and 19 references: 16 Soviet and 3 non-Soviet. The three references to English-language publications read as follows: B. P. Mason, Trans. Farad. Soc., 55, 1461, 1959; A. R. Payne, J. Appl. Phys., 28, 378, 1957; H. Roelig, Rubb. Chem. Techn., 18, 62, 1945.

Card 3/5

32349
S/190/62/004/001/011/020
B101/B110

Dependence of deformation ...

ASSOCIATION: Moskovskiy gosudarstvennyy pedagogicheskiy institut im.
V. I. Lenina (Moscow State Pedagogical Institute imeni V. I.
Lenin)

SUBMITTED: February 1, 1961

Fig. 3. Data for rubber based on
SKS-30. (1) Deformation
amplitude, (2) coefficient
K of mechanical losses at
γ = 0.01 cycles/min.
Legend: (a) Deformation
amplitude in relative
units; (b) coefficient
of mechanical losses.
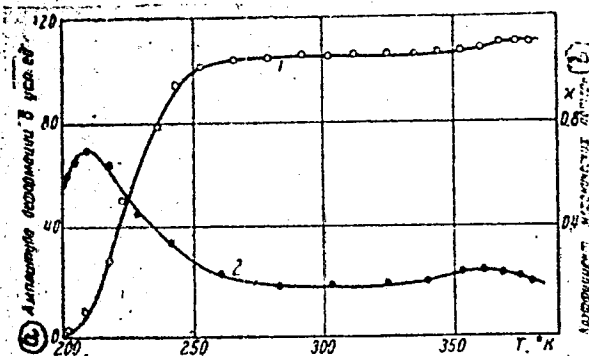
Card 4/4

S/190/62/004/009/004/014
B101/B144

AUTHORS: Bartenev, G. M., Vishnitskaya, L. A.

TITLE: Comparison of various equations for the deformation of cross-linked polymers with the experiment

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 4, no. 9, 1962, 1324-1332

TEXT: A comparison between the published and the experimental data for uncompounded rubbers gave the following results: (1) Up to 30% elongation, the equation of the statistic deformation theory $\sigma = G(\lambda^2 - 1/\lambda)$ is valid, where σ is the true stress, G is the shear modulus, and λ is the degree of elongation. (2) Up to 100% elongation, the following single parameter deformation equations apply: $\sigma = E_\infty(\lambda - 1)$, where E_∞ is the equilibrium modulus of high elasticity, and $\sigma = A(\lambda - 1/\sqrt{\lambda})$, where A is a constant proportional to the absolute temperature and dependent on the type of rubber and density of network. The elasticity potential $\mathcal{y} = A(\lambda_1+\lambda_2+\lambda_3-3)$ corresponds to the second equation, which therefore is preferable. (3) Equilibrium stretching below the point of rupture is adequately described by the two-parameter equations of M. Mooney (J. Appl. Phys., 11, 582,

Card 1/2

Comparison of various equations...

S/190/62/004/009/004/014
B101/B144

1940), G. M. Martin, F. L. Roth, R. D. Stiehler (Trans. Inst. Rubber Industr., 32, 189, 1956) and by the following equation due to G. M. Bartenev, T. N. Khazanovich (Vysokomolek. soyed., 2, 20, 1960):

$\sigma = A(\lambda - 1/\overline{\sqrt{\lambda}})[1 + B(\lambda^2 + 2/\lambda) + 2B(\lambda + 1/\overline{\sqrt{\lambda}})(\lambda + 2/\sqrt{\lambda} - 3)]$, where A and B are determined by experiment. There are 8 figures and 2 tables.

ASSOCIATION: NII rezinovoy promyshlennosti (NII of the Rubber Industry). Problemnaya laboratoriya fiziki polimerov MGPI im. V. I. Lenina (Problem Laboratory of Polymer Physics of the MGPI imeni V. I. Lenin)

SUBMITTED: May 20, 1961

Card 2/2

BARTENEV, G.M.; REMIZOVA, A.A.

Effect of impurities on the premelting stage. Ukr. fiz. zhur.
7 no.8:892-898 S '62.   (MIRA 16:1)

1. Moskovskiy gosudarstvennyy pedagogicheskiy institut.
                        (Melting) (Naphthalene)

L 10182-63   FPR/FPP(c)/EWP(q)/EWT(m)/BDS—AFFTC/
ASD/ESD-3/AFGC—Ps-4/Pr-4/Pq-4—WH/WW
ACCESSION NR: AP3000305   S/0020/63/150/001/0132/0135

AUTHOR: Bartenev, G. M.; Motorina, L. T.

TITLE: On a new effect of strain hardening of glass fibers during heat treatment

SOURCE: AN SSSR. Doklady, v. 150, no. 1, 1963, 132-135

TOPIC TAGS: inorganic glasses, strain hardening, polymeric structure, high-elastic deformation, glass fibers, defect healing, microfissures, stretching, heat treatment, deformation, glass-transition temperature, glass

TEXT: The effect on strength of stretching of glass fibers at temperatures below the glass transition temperature and the relationship observed between strain hardening and deformation have been studied. Aluminoborosilicate and soda-lime-silica glass fibers stabilized by prolonged shelf "aging" were subjected to heat treatment at various temperatures and under various constant loads. Fibers heated for 1 hr at 350C increased their strength at this

Card 1/2

L 10182-63
ACCESSION NR: AP3000305   3

temperature by 50 to 70% and exhibited greater strength after cooling to
20C. The strain hardening was shown to depend both on load and temperature.
Good results were obtained below 350C and at 70% of ultimate strength.
Treatment of defect-free fibers resulted in a reduction of initial strength.
The following conclusions were drawn: 1) Strain hardening during heat
treatment is associated with the "healing" of defects. 2) Stretching of
fibers at high temperatures is a basic requirement, either for preserving the
initial strength or for strain hardening. 3) The phenomena observed are
linked with the polymeric structure of inorganic glasses and high-elastic
deformation below the glass transition temperature and indicate that plastic
deformation takes place in the apexes of microcracks. 4) High strength of
glass fibers or fiber products at high temperatures can be maintained by
keeping the fibers stretched during processing and service. This article
was presented by Academician V. A. Kargin 23 Aug 1962. Orig. art. has:
4 figures.

ASSOCIATION: Gosudarstvenny*y nauchno-issledovatel'skiy institut stekla
(State Scientific Research Institute of Glass); Moskovskiy gosudarstvenny*y
pedagogicheskiy institut im. V. I. Lenina (Moscow State Pedagogical Institute)
SUBMITTED: 20Aug62   DATE ACQ: 10Jun63   ENCL: 00
SUB CODE: 00   NO REF SOV: 007   OTHER: 000
Card 2/2

VITMAN, F.F.; BARTENEV, G.M.; PUKH, V.P.; TSEPKOV, L.P.

Method of measuring the strength of sheet glass. Stek. i ker.
19 no.8:9-11 Ag '62.   (MIRA 15:9)
                        (Glass—Testing)

OVCHINNIKOV, V.V.; BARTENEV, G.M.; GOL'NEVA, R.K.

Durometer for determining the hardness of rubber in
international units. Kauch.i rez. 21 no.9:55-56 S '62.
(MIRA 15:11)

1. Nauchno-issledovatel'skiy institut rezinovoy
promyshlennosti.
(Rubber—Testing)
(Hardness)

;6276

S/069/62/024/002/001/008
B101/B110

|5.9801

AUTHORS: Bartenev, G. M., Zakharenko, N. V.

TITLE: Viscosity and flow mechanism of mixtures of polymers with fillers

PERIODICAL: Kolloidnyy zhurnal, v. 24, no. 2, 1962, 121-127

TEXT: The viscosity of ПИБ-20 (PIB-20) polyisobutylene, molecular weight 60,000, and CKБ (SKB) butadiene rubber with active or inactive filler additions (carbon black and chalk, respectively), was measured: (1) mixtures with inactive fillers and fillers active up to 10-15% by volume obey the Einstein equation $\eta = \eta_0 (1 + \alpha\varphi)$, where η_0 is the viscosity of the pure polymer; φ is the filler content, % by volume, and $\alpha = 5/2$. (2) The polymer forms an adsorption layer on the active filler. Thus, particles larger than the original ones are formed and kept together by Van der Waals forces and chemical bonds between active filler and rubber. The activity of a filler toward a polymer is determined by the ratio between chemical and Van der Waals bonds per surface unit of the filler. With active fillers, $\alpha > 5/2$, α was found to be 10 for PIB and carbon black, and Card 1/3

Viscosity and flow mechanism ...

S/069/62/024/002/001/008
B101/B110

6 for SKB and carbon black. Hence, $\Delta\alpha = \alpha - 5/2$ is suggested as a characteristic of the filler activity. (3) A viscosity increase after small additions of disperse filler is due to a volume reduction of the polymer phase in the mixture. Viscosity increases with a higher content of active filler, owing to the additional work required to break the three dimensional structures formed between carbon black and polymer. (4) Addition of a disperse filler to the polymer, increases the viscosity but does not affect its temperature coefficients, i.e. the activation energy of the viscous flow is not affected by the filler content, molecular weight of the polymer, and stress. (5) This independence of activation energy permits the regulation of the viscosity of polymers without a change in temperature dependence. (6) The flow takes place without rupture of filler - polymer bonds. Breaking of immediate particle-to-particle contacts of the filler does not materially contribute to the activation energy of flow. This contribution is below the limits of error. There are 5 figures and 19 references: 7 Soviet and 12 non-Soviet. The four most recent references to English-language publications read as follows: M. L. Studebaker, Indian Rubber World, 127, 215, 1952; E. Guth, Rubber. Chem. and Techn., 23, 635, 1950; V. A. Garten, Nature, 173, 997, 1954;

Card 2/3

Viscosity and flow mechanism ...

S/069/62/024/002/001/008
B101/B110

J. W. Watson, Trans. Inst. Rubber Ind., 32, 204, 1956.

ASSOCIATION: Nauchno-issledovatel'skiy institut rezinovoy promyshlcnncsti
               (Scientific Research Institute of the Rubber Industry)
               Moskovskiy gorodskoy pedagogicheskiy institut im. V. I.
               Lenina, Problemnaya laboratoriya fiziki polimerov (Moscow
               Municipal Pedagogical Institute imeni V. I. Lenin,
               Laboratory of Polymer Physics Problems)

SUBMITTED: October 21, 1961

Card 3/3

15.4300

33419
S/032/62/028/002/033/037
B124/B101

AUTHORS: Bartenev, G. M., and Gartsman, V. I.

TITLE: Dilatometer for the study of highly elastic materials at
             low temperatures

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 2, 1962, 245-?4?

TEXT: A new dilatometer consisting of the dilatometer proper and of a
cooling system equipped with a temperature controller was developed for
routine tests of rubberlike materials. Fig. 1: Sample 1 placed on a
special quartz groove 3 is contained in quartz tube 2. Quartz rod 4 with
metal cap 5 has been suspended from arm 6, and presses the sample to tube
2 through spring 7 with a force that can be controlled by the set screw 8.
The displacement of rod 4 due to contraction of the material is determined
with indicator 9. When cap 5 touches the arm of indicator 9, the circuit
of milliammeter 10 is closed. The temperature of the sample is measured
with thermocouple 11 which has been placed into the opening of accessory
sample 12 with the same heat conductivity as the sample. Cooling chamber
13 is cooled by coil 14 containing evaporated liquid nitrogen, which is
supplied from a standard Dewar flask 1 (Fig. 2). Metallic tube 2 with
Card 1/4

S/032/62/028/006/021/025
B108/B104

AUTHORS: Tsepkov, L. P., and Bartenev, G. M.

TITLE: Determination of the elastic constants of glass by means of
                strain gages

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 6, 1962, 731-732

TEXT: A method of determining the Young modulus and Poisson's ratio of
glasses and crystalline glasses is presented. Strain gages are glued to
two standard specimens and connected to an electronic tensiometer. One of
the specimens is symmetrically loaded on two sites. The Young modulus
can then be found from the difference in tensiometer readings on the
loaded and unloaded specimen. Poisson's ratio can be found in a similar
way. Results are in good agreement with those obtained by other methods.
There are 2 figures and 1 table.

ASSOCIATION: Gosudarstvennyy institut stekla (State Institute of Glass)

Card 1/1

BARTENEV, G.M.; IZMAYLOVA, L.K.

Flawless glass fibers. Dokl. AN SSSR 146 no.5:1136-1138 O '62.

(MIRA 15:10)

1. Vsesoyuznyy'nauchno-issledovates'skiy institut steklovolokna
i Moskovskiy gosudarstvennyy pedagogicheskiy institut im. V.I.
Lenina. Predstavleno akademikom V.A.Karginym.

(Glass fibers)

1963

SOROCHISHIN, A.G.; BARTENEV, G.M.; MALITSKAS, A., red.;
TOLVAYSHENE, B., tekhn. red.

[Manufacture, properties, and structural uses of glass
reinforced plastics of continuous molding] Proizvodstvo,
svoistva i primenenie v stroitel'stve stekloplastikov
nepreryvnogo formvaniia. Vil'nius, TSentr. biuro tekhn.
informatsii i propagandy Gos.kom-ta Soveta Ministrov
Ministrov Litovskoi SSR po delam stroit. i arkhit., 1963.
71 p.   (MIRA 16:10)
          (Glass reinforced plastics)

ACCESSION NR: AT4030811   S/0000/63/000/000/0325/0332

AUTHOR: Bartenev, G. M.; Razumovskaya, I. V.

TITLE: On the effect of surface active media on the breakdown kinetics of solid bodies

SOURCE: AN UkrSSR. Institut metallokeramiki i spetsial'ny*kh splavov. Poverkhnostny*ye yavleniya v rasplavakh i protsessakh poroshkovoy metallurgii (surface phenomena in liquid metals and processes in powder metallurgy). Kiev, Izd-vo AN UkrSSR, 1963, 325-332

TOPIC TAGS: surface tension, surface active medium, breakdown kinetics, overstress

ABSTRACT: In this paper the authors examined the effect of the surface active media on the prolonged stability and the development of breakdown in large bodies. The breakdown of solid bodies is an exchange process, but the condition of the body surface, particularly its surface tension, substantially influences the magnitude of stability and the rate of breakdown. Through a series of mathematical arguments, the authors derived formulas for calculating the rate of breakdown. It was found that a number of materials (silicate glass, solid polymers) have a different time dependence stability in surface active medium than in an inactive medium. The

Card 1/2

ACCESSION NR: AT4030811

authors assumed that the front of the monomolecular layer moves with a certain average velocity U. In reality, at small pressures and crack a velocity less than U, the slowest molecules of the medium lag behind the crack, and the length of time is found to be more than that calculated. On the other hand, even at a growth velocity of the crack greater than U, the portion of the fast molecules keeps pace with the growing crack, affecting its velocity; the time interval proves to be less than that calculated. Orig. art. has: 11 formulas and 2 figures.

ASSOCIATION: Moskovskiy gosudarstvennyⁱy pedagogicheskiy institut im. V. I. Lenina (Moscow State Pedagogical Institute)

SUBMITTED: 23Nov63   DATE ACQ: 16Apr64   ENCL: 00

SUB CODE: PH, CH   NO REF SOV: 006   OTHER: 003

Card 2/2

S/191/63/000/001/013/017
B117/B180

AUTHORS: Bartenev, G. M., Gorbatkina, Yu. A., Luk'yanov, I. A.

TITLE: Thermal properties and methods of measuring thermal expansion, thermal capacity, and thermal conductivity of polymers

PERIODICAL: Plasticheskiye massy, no. 1, 1963, 56 - 64

TEXT: Methods and apparatus for studying the thermal properties of polymers are reviewed in a survey based on papers by Western and Soviet authors for the period 1903 - 1962. The following subjects are dealt with: (1) Measurement of thermal expansion by linear and volumetric dilatometers; (2) determination of thermal capacity by calorimeters; (3) study of the vitrification process on the basis of thermal expansion and capacity; (4) methods of measuring thermal conductivity and thermal diffusion. There are 11 figures, 4 tables, and 65 references.

Card 1/1

Z/009/63/000/002/002/004
E112/E492

AUTHORS: Bartenev, G.M., Vishnitskaya, L.A.

TITLE: Effects of temperature on the relaxation properties of rubber elastomers

PERIODICAL: Chemický průmysl, no.2, 1963, 97-99

TEXT: Non-filled vulcanizates from natural, butyl, butadiene-nitrile, butadiene and butadiene-styrene rubbers were tested for sudden stress relaxation properties at 20 and 70°C.   Stress relaxation at 20°C is closely connected with the chemical structure of the elastomer.   The shortest relaxation periods were shown by natural and butyl rubber, while butadiene-nitrile rubbers took the longest.   Butadiene and butadiene-styrene rubbers had inter-mediate values.   Relaxation curves were in agreement with the heats of transition of the second order: increase of irregularity of structure, presence of bulky side-chains and polar groups tend to suppress the rearrangement of the elastomer molecules and retard chain relaxation.   Stress-relaxation curves at 70°C were entirely different, showing increased relaxation rates, generally about 10 times greater than at 20°C.   The stress-relaxation
Card 1/2

Effects of temperature ...   Z/009/63/CCC/CC2/CC2/CC4
                                               E112/E492

curves at 70°C are practically identical for all types of rubber.
One can conclude that the rate of chemical bond fission is the
same for all rubbers at 70°C.   A novel method of plotting the
relaxation curves is presented, permitting to establish
relaxation equilibria.   There are 5 figures.

ASSOCIATION: Vědeckovýzkumný ústav gumárenského průmyslu, Moskva
             (Scientific Research Institute of the Rubber
             Industry, Moscow)

SUBMITTED: August 1, 1962

Card 2/2

S/138/63/000/003/006/008
A051/A126

AUTHORS: Bartenev, G. M., Lavrent'yev, V. V., Yel'kin, A. I.

TITLE: The friction coefficient of rubber

PERIODICAL: Kauchuk i rezina, no. 3, 1963, 20 - 22

TEXT: The friction coefficient of rubber is defined as the main charac-
teristic in calculating the friction properties of parts and machine units; in
engineering practice it is the ratio of friction force F to the normal load N:
$\mu = \frac{F}{N}$. The magnitude of the nominal surface of contact parts is not taken into
account. The effect of the nominal contact surface on the friction coefficient
of rubber is studied, measured at N = const, and p = const (nominal pressure -
- p = N/S_n). Conclusion: the friction coefficient measured at N = const depends
on the nominal contact surface; measured at p = const it does not depend on it.
Experiments have confirmed this conclusion. The friction coefficient was meas-
ured on a tribometer instrument (Figure 1) based on the idea that the contact
surface changes simultaneously with a change of the load, whereby the pressure

Card 1/3

The friction coefficient of rubber

S/138/63/000/003/006/008
A051/A126

remains constant. For materials of various hardness, a different change in the friction coefficient is noted depending on the nominal contact surface. It is generally concluded that, when using the friction coefficient for calculating parts and evaluating their friction properties, it is necessary to consider that the friction coefficient determined according to ГОСТ-426-57 (GOST-426-57) is only a relative value, since it depends on the magnitude of nominal contact surface and nominal load. At a constant normal pressure, the friction coefficient is actually a constant value for various nominal contact surfaces and can be used in calculating constructions only for normal pressures where it has been measured. In other normal pressures, it can be calculated from the law of rubber friction. There are 2 figures and 1 table.

ASSOCIATION: Problemnaya laboratoriya fiziki polimerov pri MGPI im. V. I. Lenina (Laboratory for Problems of Polymer Physics at the MGPI im. V. I. Lenin)

Card 2/3
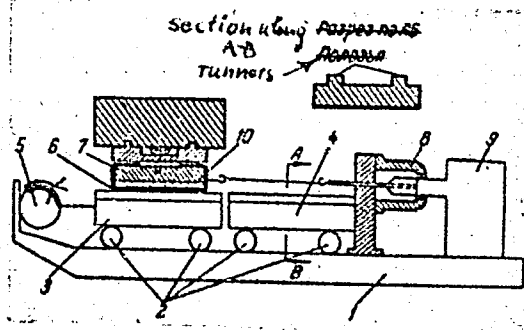
The friction coefficient of rubber   S/138/63/000/003/006/008
                                                      A051/A126

Figure 1. Diagram of the tribometer for the study of the effect of nominal con-
           tact surface on the friction coefficient of rubber under a constant
           pressure

Legend: 1 - steel base, 2 - rollers,
3, 4 - carriages, 5 - dynamometer,
6 - tested sample, 7 - holder, 8 - micro-
metric screw, 9 - reducer, 10 - porous
rubber.

Card 3/3

ACCESSION NR: AP3011671

0/0004/63/010/010/0587/0589

AUTHOR: Bartenev, G. M.

TITLE: On the activation energy of the viscous flow of polymers

SOURCE: Plaste und Kautschuk, v. 10, no. 1963, 587-589

TOPIC TAGS: activation energy, viscous flow, viscosity of polymer, characteristic of polymer, polymer production

ABSTRACT: The activation energy of the viscous flow is the most important characteristic of a polymer; it is related to its structure and determines the temperature coefficient of viscosity. The flow of various anomalous - viscous systems is usually examined in rotation-viscosimeters either at constant speed of thrust (Y = constant) or at constant pressure of thrust (P = constant). A clear connection exists between the deformation speed of the viscous flow Y the pressure of thrust. P, and viscosity of the stationary flow $h = \frac{P}{Y}$ The present work formulates the experimental determination of the activation energy of viscous flow of polymers and specifies the physical interpretation of this energy. It examines the causes of the discrepancy in this energy when

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ACCESSION NR: AP3011671

determined at constant pressure of thrust on one hand and at constant thrust deformation speed on the other. It is concluded that the energy values derived by method V = const. Are erroneous and lack all physical significance, but the activation energy can also be correctly determined with the test data obtained by this method is the viscosity values λ at fixed pressure of thrust are compared at various temperatures. Assuming temperature dependence of the activation energy, the physical significance of the quantity to be determined was specified. For a specification and determination of the nature of the flow of polymers, further examinations of the temperature dependence of the activation energy of viscous flow are a necessity. Orig. art. has: 6 figures, 1 table, and 6 formulas.

ASSOCIATION: Staatliches Paedagogisches Institut "W. I. Lenin", Lehrstuhl der Physik der Polymeren, (Moskau (Pedagogical Institute, Dpt. Physics of Polymers)

SUBMITTED: 15Jun63   DATE ACQ: 28Oct63   ENCL: 00

SUB CODE: MA,CH   NO REF SOV: 003   OTHER: 007

Card 2/2

PANSHIN, B.I.; BARTENEV, G.M.; FINOGENOV, G.N.; KASYUK, V.D.

Effect of water on the mechanical properties of organic glass.
Plast. massy no.11:32-36 '63.   (MIRA 16:12)

BARTENEV, G.M.; VISHNITSKAYA, L.A.

Study of the flow of rubberlike polymers by constant rate
stretching. Vysokom. soed. 5 no.12:1837-1842 D '63.
                                              (MIRA 17:1)
1. Nauchno-issledovatel'skiy institut rezinovoy promyshlen-
nosti i Moskovskiy gosudarstvennyy pedagogicheskiy institut.

BARTENEV, G.M.

Activation energy of the flow of rubberlike polymers. Kauch.
i rez. 22 no.6:30-31 Je '63.   (MIRA 16:7)

1. Problemnaya laboratoriya fiziki polimerov Moskovskogo
gosudarstvennogo pedagogicheskogo instituta imeni Lenina i
Nauchno-issledovatel'skiy institut rezinovoy promyshlennosti.
                    (Polymers)

S/032/63/029/002/022/028
B101/B186

AUTHORS: Bartenev, G. M., and Yel'kin, A. I.

TITLE: Vacuum tribometer

PERIODICAL: Zavodskaya laboratoriya, v. 29, no. 2, 1963, 227 - 229

TEXT: A tribometer is described which differs from the ordinary types in
that the friction strength is measured by means of wire strain gauges in a
vacuum chamber and that the temperature can be varied between -70 and
+100°C by a copper block with channels through which flow the cooling or
heating liquids. The rate of feed can be varied between 10^{-3} and 10^2 mm/min.
The maximum error of measurement was 3%. The friction coefficient can be
determined in vacuo at 10^{-5} mm Hg or in inert gas. It was found for CKC-30
(SKS-30) rubber that below 15°C the friction coefficient measured in vacuo
differs considerably from that measured in air because the coefficient of
friction in air has been assumed too low; presumably owing to the condensa-
tion of water vapor on the friction surface. There are 2 figures.

Card 1/1

ZELENEV, Yu.V.; BARTENEV, G.M.; DEMISHEV, G.K.

Determination of the dynamic characteristics of polymers by the resonance method. Zav.lab. 29 no.7:868-872 '63.   (MIRA 16:8)

1. Moskovskiy gosudarstvennyy pedagogicheskiy institut im. Lenina.
(Polymers--Testing)

L 12411-63   EPR/EWP(j)/EPF(c)/EWP(q)/EWT(m)/BDS AFFTC/ASD Ps-4/Po-4/
Pr-4/Pq-4   RM/WH/JD

ACCESSION NR: AP3001400   S/0020/63/150/004/0784/0787

AUTHOR: Bartenev, G. M.; Razumovskaya, I. V.

TITLE: Time dependence of the strength of brittle solids in surface-active
media

SOURCE: AN SSSR. Doklady, v. 150, no. 4, 1963, 784-787

TOPIC TAGS: strength of materials, brittleness, surface-active media, crack
propagation in solids, polymethylcrylate

ABSTRACT: The fluctuation theory of the strength of brittle solids in a passive
medium developed by Bartenev (Izv. Akad. Nauk SSSR, OTN, No. 9, (1953), page 53)
is extended to the study of the time dependence of the strength in surface-active
media. The effect of the medium on the kinetics of the growth of the already-
existent cracks is considered. Three stages of the process of rupture under
stress and under effect of thermal fluctuations are distinguished. When the
velocity of crack propagation v is smaller than the rate of surface diffusion v
sub D, the former is determined by the surface-active medium. When v becomes
equal to v sub D, it increases abruptly in steps until v is larger than v sub D.

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L 12411-63

ACCESSION NR: AP3001400

3

At this stage, the growth of the crack is not affected by the surface-active medium. Expressions are derived for these three stages giving the time between the application of stress and the rupture as a function of temperature, form factor, stress, and some other parameters. Experimental curves for time vs. stress for glass and for polymethylmetacrylate are compared with the theoretical expressions. Orig. art. has 5 equations and 2 figures.

ASSOCIATION: Moskovskiy gosudarstvennyy pedagogicheskiy institut im. V. I. Lenina (Moscow State Pedagogic Institute)

SUBMITTED: 08Feb63   DATE ACQ: 01Jul63   ENCL: 00

SUB CODE: 00   NO REF SOV: 008   OTHER: 003

Card   2/2

BARTENEV, G.M.; YEL'KIN, A.I.

Friction properties of rubberlike polymers at low temperatures.
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                              (Friction) (Polymers)